Roxolana O. Kashuba

Research Hydrologist, United States Geological Survey, 3916 Sunset Ridge Road, Raleigh, NC 27607
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Education

Duke University, Durham, North Carolina
Nicholas School of the Environment, Division of Environmental Sciences and Policy
Ph.D. in Statistical Water Quality Modeling. May 2010.
Dissertation title: *Bayesian methods to characterize uncertainty in predictive modeling of the effect of urbanization on aquatic ecosystems.*
Committee: Kenneth Reckhow (advisor), Song Qian, Gerard McMahon, Thomas Cuffney, Emily Bernhardt.

University of Illinois at Chicago, Chicago, Illinois
School of Public Health, Environmental and Occupational Health Sciences Division
M.S. in Environmental Science. August 2003.
Thesis title: *Characterization of Short-term Fine Particulate Matter Measurement in Region 5.*
Committee: Peter Scheff (advisor), Serap Erdal, Robert Anderson.

Northwestern University, Evanston, Illinois
B.A. in Chemistry with biochemistry focus; minor in Psychology. June 2001.

Research Interests

Water quality modeling, statistical methods, environmental management decisions, uncertainty characterization

Publications

A. Refereed Publications

Kashuba, R., Cuffney, T., McMahon, G., Reckhow, K., Gerritsen, J. and Davies, S. Parameterizing the Biological Condition Gradient in the northeast United States using a Bayesian network approach. (In review)

Kashuba, R., Cuffney, T., Qian, S., Reckhow, K. Combining expert knowledge with data to develop a Bayesian network describing the impact of urbanization on aquatic macroinvertebrate communities in the southeast United States. U.S. Geological Survey Scientific Investigations Report 2010-XXXX, XXp. (In review)

Kashuba, Roxolana Oresta. Bayesian methods to characterize uncertainty in predictive modeling of the effect of urbanization on aquatic ecosystems. Ph.D. dissertation, Duke University, 2010. http://hdl.handle.net/10161/2366

Cuffney, T.F., **Kashuba, R.**, Qian, Song S., Alameddine, I., Cha, Y., Lee. B., Coles, J.F. and McMahon, G. Multilevel regression models describing regional patterns of invertebrate and algal responses to urbanization across the United States. (In press)

Kashuba, R., Cha, Y., Alameddine, I., Lee, B., and Cuffney, T. Multilevel Hierarchical Modeling of Benthic Macroinvertebrate Responses to Urbanization in Nine Metropolitan Areas across the Conterminous United States. U.S. Geological Survey Scientific Investigations Report 2009-5243, 88p.

Kashuba, Roxolana O., Scheff, Peter A. Nonlinear Regression Adjustments of Multiple Continuous Monitoring Methods Produce Effective Characterization of Short-Term Fine Particulate Matter. J Air Waste Manag Assoc. 2008 Jun; 58(6):812-20.

B. Technical Reports and Published Conference Proceedings

Cuffney, T.F., McMahon, G., **Kashuba, R.**, May, J.T., and Waite, I.A. responses of Benthic Macroinvertebrates to Environmental Changes Associated with Urbanization in Nine Metropolitan Areas of the Conterminous United States. In Webb, Richard M.T., and Darius Semmens, eds, Proceedings of the Third Interagency Conference on Research in the Watersheds, September 8-11, 2008.

Salice, C., **Kashuba, R.**, Steeger, T., Jones, R. D. Environmental Fate and Ecological Risk Assessment for the Section 3 Registration Decision of Prothioconazole. (PC code: 113961, DP barcode: D324660, Decision number 341716) Part of EPA-HQ-OPP-2005-0312; FRL-8113-6. Joint review with Canadian Pest Management Regulatory Authority (PMRA). June 1, 2006.

Kashuba, R., Sutton, C., Jones, R.D. Drinking Water Assessment for the Section 3 Registration Decision of Prothioconazle. (PC Code: 113961, DP barcode: D324659) Part of EPA-HQ-OPP-2005-0312; FRL-8113-6. Joint review with Canadian Pest Management Regulatory Authority (PMRA). April 26, 2006.

Costello, K., **Kashuba, R.**, Ravenscroft, J., Jones, R.D. Environmental Fate and Ecological Risk Assessment for the Section 4 Re-registration Eligibility Decision of Ametryn. (PC code: 080801, DP barcode: D316694, Decision number 341716) Part of EPA-HQ-OPP-2004-0411; FRL-7692-7. June 22, 2005.

Costello, K., **Kashuba, R.**, Jones, R.D. Drinking Water Assessment for the Section 4 Re-registration Eligibility Decision of Ametryn. (PC Code: 080801, DP barcode: D307097, D307105) Part of EPA-HQ-OPP-2004-0411; FRL-7692-7. June 7, 2005.

Kiernan, B., **Kashuba, R.**, Steeger, T., Jones, R.D. Environmental Fate and Ecological Risk Assessment for the Section 3 Registration Decision of Aminopyralid. (PC codes: 005100, 005209, DP barcodes: D301658, D301682, D301691, D306825, Decision number 341121) Part of EPA-HQ-OPP-2004-0408; FRL-7690-9. May 10, 2005.

Kashuba, R., Jones, R.D. Drinking Water Assessment for the Section 3 Registration Decision of Aminopyralid. (PC codes: 005100, DP barcode: D301682) Part of EPA-HQ-OPP-2004-0408; FRL-7690-9. February 3, 2005.

Kashuba, Roxolana O., Scheff, Peter A., Rizzo, Michael. Characterization of Nephelometer- Measured Short-Term Fine Particulate Matter in Region 5. Proc. AWMA Symposium on Air Quality Measurement Methods and Technology, Durham, NC (April 2004).

Grants Received

- United States Geological Survey Cooperative Agreement Award for Ph.D. Student Research Salary Support (2008-2010)
- Research Travel Grant to elicit expert prior distributions in Boston, Massachusetts, Baltimore, Maryland, and Madison, Wisconsin. Funded by United States Geological Survey (2009).
- Conference Travel Grant to attend North American Benthological Society (NABS) Annual Meeting in Grand Rapids, Michigan. Funded by United States Geological Survey (2009).

- Scientific Meeting Travel Grant to present research in Portland, Maine, Reston, Virginia, and Baltimore, Maryland. Funded by United States Geological Survey (2009).
- Conference Travel Grant to present at American Water Resources Association (AWRA) Annual Conference in New Orleans, Louisiana. Funded by United States Geological Survey (2008).
- National Institute for Occupational Safety and Health (NIOSH) Graduate Traineeship Grant in Industrial Hygiene (2001-2003).
- Conference Travel Grant Award to present at American Industrial Hygiene Association (AIHA) Conference and Exhibition in Dallas, Texas. Funded by University of Illinois at Chicago School of Public Health (2003).

Presentations

A. Invited Presentations

Kashuba, Roxolana, Cuffney, T.F., McMahon, G., Qian, S., Reckhow, K., Gerritsen, J., and Davies, S. 2010. Using a Bayesian Network Approach to Model the Effects of Urbanization on the Condition of Benthic Macroinvertebrate Assemblages in the Northeast U.S. as Defined by the Biological Condition Gradient. Presented at Seventh National Monitoring Conference, Extended session- Using the BCG and Stressor-Response Information in an Urbanizing Setting (Denver, Colorado).

Kashuba, Roxolana. 2009. Parameterizing the Biological Condition Gradient in the northeast United States using a Bayesian network approach. Presented at National Water Quality Assessment Program (NAWQA) National Leadership Team (NLT) meeting (Raleigh, North Carolina).

Kashuba, Roxolana. 2009. Using a Bayesian Network Approach to Model the Effects of Urbanization on the Condition of Benthic Macroinvertebrate Assemblages. Presented at USGS North Carolina Water Science Center Water Table Seminar (Raleigh, North Carolina).

Kashuba, Roxolana. 2009. Parameterizing the Biological Condition Gradient in the northeast United States using a Bayesian network approach. Presented at USGS Wisconsin Water Science Center Brown Bag Seminar (Madison, Wisconsin).

Kashuba, Roxolana. 2009. A Bayesian network example: Parameterizing the Biological Condition Gradient in the northeast United States. Guest lecturer for Water Quality Modeling (ENVIRON 335.01) at Duke University (Durham, North Carolina).

Kashuba, Roxolana. 2009. Parameterizing the Biological Condition Gradient in the northeast United States using a Bayesian network approach. Presented at USGS Massachusetts-Rhode Island Water Science Center Brown Bag Seminar (Northborough, Massachusetts).

Kashuba, R., Cuffney, T.F., McMahon, G., Reckhow, K., Gerritsen, J., and Davies, S.. 2009. Parameterizing the Biological Condition Gradient in the Northeast U.S. Using a Bayesian Network Approach. Presented at North American Benthological Society (NABS) Annual Meeting, Special Session - Applying the Biological Condition Gradient for Protecting Our Waters: Regional and State Experiences (Grand Rapids, Michigan).

Kashuba, Roxolana. 2009. EUSE Models: Multilevel hierarchical models and Bayesian network models. Presented at United States Geological Survey (USGS) Urban Effects Workshop (Raleigh, North Carolina).

Kashuba, Roxolana. 2009. Bayesian Network Overview. Presented at Massachusetts Water Science Center EUSE Modeling Project Collaboration and Data Solicitation Meeting (Northborough, Massachusetts).

Cuffney, Thomas and **Kashuba, Roxolana**. 2009. Modeling in support of the EUSE. Presented at United States Geological Survey (USGS) National Water Quality Assessment Program (NAWQA) Ecological National Synthesis (ENS) modeling meeting (Reston, Virginia).

Kashuba, Roxolana. 2009. Expert elicitation, Bayesian networks, and Southeast US modeling process. Presented at Maine-EUSE-EPA-Duke BCG (Biological Condition Gradient) Project Meeting (Portland, Maine).

Kashuba, Roxolana. 2009. Expert elicitation: what is it and when do you use it. Guest lecturer for Reckhow Water Quality Statistics Laboratory Meeting (Durham, North Carolina).

Kashuba, Roxolana and Reckhow, Kenneth. 2008. Multilevel and Bayes net modeling of USGS NAWQA data on the impact of urbanization on downstream ecosystems. Presented at Duke University Nicholas School of the Environment Ecosystem Service Faculty Group Meeting (Durham, North Carolina).

Kashuba, Roxolana. 2008. EUSE (Effect of Urbanization on Stream Ecosystems) Invertebrate Multilevel Modeling: Results of Duke Reckhow Lab Analysis. Presented at Maine-EUSE-EPA-Duke BCG (Biological Condition Gradient) Pilot Meeting (Portland, Maine).

B. Oral Presentations

Kashuba, Roxolana. 2010. Using a Bayesian network approach to model the system of effects of urbanization on aquatic ecosystems. Presented at 3rd USGS Modeling Conference: Understanding and Predicting for a Changing World (Denver, Colorado).

Kashuba, Roxolana. 2010. Developing Bayesian Networks to Model the Effects of Urbanization on Benthic Macroinvertebrate Assemblages. Presented at Advanced Modeling Methods Meeting (Lafayette, Louisiana).

Kashuba, Roxolana. 2010. Developing New Approaches to Model the Effects of Urbanization. Presented at Research Triangle Institute Water Group Seminar (Research Triangle Park, North Carolina).

Kashuba, Roxolana. 2009. Northeast BCG Bayes net overview: habitat modeling. Presented at Northeast Biological Condition Gradient (BCG) Bayesian Network Habitat Expert Elicitation Meeting (Madison, Wisconsin).

Kashuba, Roxolana. 2009. Northeast Bayes net construction marches on. Presented at Reckhow Water Quality Statistics Laboratory Meeting (Durham, North Carolina).

Kashuba, Roxolana. 2009. Urban drivers in the Northeast US Bayesian network. Presented at Second Northeast Biological Condition Gradient (BCG) Bayesian Network Urban Expert Elicitation Meeting (Baltimore, Maryland).

Kashuba, Roxolana. 2009. Northeast US Bayesian network overview: hydrology and water quality nodes. Presented at Northeast Biological Condition Gradient (BCG) Bayesian Network Hydrological Expert Elicitation Meeting (Northborough, Massachusetts).

Kashuba, Roxolana. 2009. Northeast BCG Bayes net modeling overview. Presented at Northeast Biological Condition Gradient (BCG) Bayesian Network Biological Expert Elicitation Meeting (Portland, Maine).

Kashuba, Roxolana. 2009. BCG model construction update, how Hugin calculates posteriors (vs. propagating evidence), and lessons learned. Presented at Reckhow Water Quality Statistics Laboratory Meeting (Durham, North Carolina).

Kashuba, Roxolana. 2009. Northeast US Bayesian network urban driver expert elicitation. Presented at Northeast Biological Condition Gradient (BCG) Bayesian Network Urban Expert Meeting (Baltimore, Maryland).

Kashuba, Roxolana and Lee, Boknam. 2008. Multilevel Modeling Clarifies Effects of Urbanization on Stream Macroinvertebrates. Presented at American Water Resources Association (AWRA) Annual Water Resources Conference (New Orleans, Louisiana).

Kashuba, Roxolana and Lee, Boknam. 2008. Macroinvertebrate Community Responses to Urbanization. Presented at Water Resources Research Institute of the University of North Carolina Annual Conference: Drought Management and Water Conservation (Raleigh, North Carolina).

Kashuba, Roxolana. 2008. Biological Condition Gradient modeling methods. Presented at Reckhow Water Quality Statistics Laboratory Meeting (Durham, North Carolina).

Kashuba, Roxolana. 2007. A Poisson Problem: Killing Fish with Statistics. Presented at Duke University Nicholas School of the Environment Ph.D. Graduate Afternoon Seminar (Durham, North Carolina).

Kashuba, R.O. 2005. Synthesizing multiple sources of data on hydrolytic, photolytic, and metabolic breakdown of pesticides to predict aquatic environmental concentrations. Presented at United States Environmental Protection Agency Environmental Fate and Effects Division Drinking Water Assessment Training Conference (Washington, District of Columbia).

Kashuba, R., Scheff, P.A., Rizzo, M. 2004. Characterization of Nephelometer- Measured Short-Term Fine Particulate Matter in Region 5. Presented at Air and Waste Management Association Symposium on Air Quality Measurement Methods and Technology (Research Triangle Park, North Carolina).

C. Poster Presentations

Kashuba, R., Scheff, P.A., Rizzo, M. 2003. Using Linear and Non-linear Regression to Compare PM2.5 Measurements from Different Monitoring Technologies Across Varying Time Scales. Presented at American Industrial Hygiene Conference and Exhibition (Dallas, Texas).

Kashuba, R., Scheff, P.A. 2003. Quality Control of Ambient Air Pollutant Concentration Data from Multiple Monitoring Sites Across the Same Region. Presented at University of Illinois at Chicago Conference on the Environment (Chicago, Illinois).

Honors and Awards

- Who's Who in America
- American Association for the Advancement of Science/Science Magazine Program for Excellence in Science Award Recipient

- Who's Who Among Executives and Professionals "Honors Edition"
- United States Environmental Protection Agency Office of Pesticide Programs Superior Accomplishment Recognition Award for assessment of Prothioconazole Ecological Risk
- Chair of Environmental Fate and Effects Division Fate and Transport Technology Team
- United States Environmental Protection Agency Office of Inspector General Superior Accomplishment Recognition Award for instrumental contribution to BioWatch preliminary research
- Delta Omega Public Health Honor Society
- University of Illinois at Chicago Dean's List
- Alpha Lambda Delta Freshman Honor Society
- National Society of Collegiate Scholars
- Golden Key Honor Society
- Northwestern University Dean's List

Research Experience

Aquatic Ecosystem Statistical Modeling, United States Geological Survey (2008-present)
Research Hydrologist: Quantifying the effect of urbanization on aquatic stream biota (macroinvertebrates, algae, and fish) at multiple scales using innovative hierarchical multilevel techniques and Bayesian networks. Developing a method for parameterizing the Biological Condition Gradient (BCG) for Effect of Urbanization on Stream Ecosystems (EUSE) dataset, incorporating expert elicitation and Bayesian uncertainty characterization. Interpreting ecosystem response in terms predictive probability of meeting water quality criteria due to urban impairment.

Statistical Water Quality Modeling and Decision Analysis, Duke University (2006-2008)
Research Assistant: Developed hierarchal Bayesian model (using interrelated data, process, and parameter tiers) describing larval survival in a river in time and space, as affected by covariate data (temperature, discharge) and multiple, different error terms. Simulated data sets, then sampled from the joint distribution of coefficients and error terms to verify model form. Model can be expanded to predict survival distributions resulting from different management decisions and variable environmental conditions.

Pesticide Aquatic Fate Modeling and Ecological Risk Assessment, United States Environmental Protection Agency (2004-2006)
Environmental Scientist (GS-12): Synthesized multiple scientific sources of information (lab studies, models, expert judgment) to predict integrated pesticide fate in various application scenarios. Reviewed pesticide environmental fate studies for scientific validity, logic, and coherence. Modeled hydrolytic, photolytic, and metabolic breakdown of pesticides of varying acidity, solubility, and mobility. Characterized environmental exposure as part of an ecological risk assessment process. Negotiated risk mitigation measures via communication of scientific inferences to decision-making audiences. Critically evaluated and peer reviewed risk assessment-related work products.

Air Quality Program Evaluation, United States Environmental Protection Agency (2003-2004)
Environmental Analyst (GS-9): Researched and integrated the air quality science behind projects evaluating the effectiveness of BioWatch air monitoring and coal-fire mercury emission standards. Identified and determined usefulness of data sources internal and external to the EPA. Advised non-scientific audit team members on use of systematic information collection methodology.

Air Quality Modeling, University of Illinois at Chicago (2002-2003)

Research Assistant: Collected, quality controlled and analyzed complex data sets of air pollution concentrations. Developed linear and nonlinear multivariate regression models to predict 24-hour gravimetric $PM_{2.5}$ concentrations from hourly TEOM, beta-gauge and nephelometer measurements, accounting for meteorological influence (temperature and humidity). Prepared 200-page thesis report, two 15-page articles for publication, and presented research results at three national, scientific conferences.

EMPACT Particulate Matter Mapping Project, Illinois Environmental Protection Agency (2002-2003)
Research Assistant: Established method of reporting ambient particulate matter concentrations using web-based technology. Interpreted and presented implications of air quality data to general, Internet-browsing public. Collaborated with United States Environmental Protection Agency and University of Illinois environmental scientists, GIS technicians, IT consultants, and public relations specialists.

International Occupational Health Assessment, Great Lakes Center for Occupational and Environmental Health, University of Illinois at Chicago School of Public Health (2001-2002)
Research Assistant: Translated and statistically analyzed Ukrainian, Russian, and Belarusian medical data collected as part of an epidemiological study to link occupational exposure to effects on coal miner lungs. Worked with doctors who administered physical exams and x-rays to demonstrate the detrimental effects of coal mine exposure on miners. Informed occupational health regulations in Eastern Europe.

Software Design and Testing, Computer Adaptive Technologies, Inc. (2000-2001)
Management Information Systems Intern: Created and implemented quality control test plans for new versions of software for an online testing company. Meticulously discovered and cataloged new functionalities, foresaw potential interactions with old functionalities, and logically planned out how each was to be verified. Manipulated new and complex software code. Collaborated with senior computer programmers. Promoted twice in six months.

Biology Guided Inquiry Learning Environments (BGuILE), Northwestern University (2000)
Research Assistant: Designed study of high school learning capacity for science as part of a research team developing a software program for use in a diverse range of classrooms to interactively teach students investigative and analytical skills by conducting simulated scientific experiments. Critiqued exploratory tests about natural selection and analyzed subsequent student response data.

Teaching Experience

Duke University Nicholas School of the Environment and Earth Sciences (2006-2008)
Teaching Assistant:

- Watershed Hydrology
- Science and Values
- Environmental Decision Analysis
- Introduction to Environmental Science

Responsibilities include developing and teaching the applied computer laboratory portions of courses (using software: Matlab, R, Excel, Palisade DecisionTools), lecturing, holding office hours for students with questions, organizing classroom logistics, grading problem sets, papers, projects, and exams.

University of Illinois at Chicago School of Public Health, Environmental and Occupational Health Sciences Division (2002-2003)
Teaching Assistant:

- Environmental Calculations

- Air Quality Management
- Air Quality Laboratory

Explained comprehensive environmental principles, graded homework and provided additional instruction for students by appointment. Innovated traditional air lab data collection methodology by providing for digitization of gaseous pollutant output, drafting concise, standardized sampling directions, and researching and improving wind rose creation software options. Coordinated and supported student implementation of new sampling procedures, provided technical guidance and resolved conflict in air pollutant data inconsistencies.

Math and Science Private Tutor (2000-2001)
Tutor: Tutored Kendal College (Evanston, IL) students in algebra, trigonometry, pre-calculus, calculus, and statistics and high school student (Evanston, IL) in chemistry, physics, trigonometry, and calculus coursework.

Plast Ukrainian Youth Organization (1995-2006)
Counselor: Planned, organized and implemented weekly scouting meetings in the Ukrainian language for children ages 5 through 18. Taught merit badges, including nature-lover, environmentalist, swimming, first aid, pioneering, camping, wilderness survival, and Morse code in Ukrainian.

Activities

- Science mentor coach for underrepresented minorities with Duke University Medical Center BOOST program (Building Opportunities and Overtures in Science and Technologies)
- Duke University Women in Science and Engineering Steering Committee
- Duke University Graduate and Professional Women's Network
- Duke University Nicholas School of the Environment Statistics Curriculum Revision Committee
- University of Illinois at Chicago Public Health Student Association
- University of Illinois at Chicago School of Public Health Program Changes Committee Delegate
- Northwestern University Dance Marathon Philanthropy Volunteer Coordinator
- Northwestern University Special Olympics Volunteer

Professional Organization Membership

- Water Environmental Federation (WEF)
- North Carolina Association of Environmental Professionals (NCAEP)
- Statistical and Applied Mathematical Sciences Institute (SAMSI)
- Society of Women Environmental Professionals (SWEP)
- American Public Health Association (APHA)
- American Industrial Hygiene Association (AIHA)
- Air and Waste Management Association (AWMA)